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SEAMLESS STEEL TUBES

By S. D. LOCKSHIN, '29.

Steel tubes form a substantial part of the production of finished steel. Steel tubes are used in almost every industry. Among these industries are, of course, the water and gas systems, building trades, and the automobile industries.

The manufacture of the seamless tube is not a new industry, but it is still undeveloped to a certain extent. Steel tubes were first made in Germany about twenty-five years ago. At that time they were not in great demand mainly because of the high cost, but at present all industries prefer the seamless tube.

Some of the more common uses of the seamless tube are for oil well casings, drill pipes, boiler tubes, and super-heat systems. In the automobile industry we find the tubes being used in the steering shaft, drive shaft, and differential. The building trades look favorably on seamless tubing because it is cheaper than brass, and unquestionably superior to the welded pipe.

There are many different processes of manufacturing these tubes, but they are all based on essentially the same principle. The one to be explained is a German process, imported, installed, and operated by German engineers.

It is not necessary at this time to explain the process of making the ingots or bar steel. Nearly everyone is familiar with the ordinary Bessemer or the open hearth processes. The ingots or billets used are around ten inches in diameter, and average thirty-six to forty-two inches in length.

The first step is the chipping of the ingots. A large machine chips off all the dirt and scale acquired when the bar was being cooled. This is done to remove the impurities and to prevent a defect in the finished tube.

The cleaned ingots are then placed in a furnace and heated to a white heat. They are now ready for the piercer. The hot ingot is gripped by a pair of working rolls, conically inclined 5 to 8 degrees to the horizontal plane. These rolls rotate in the same direction. A tapered plug which is held by a long rod is then placed at the open end. The distance between the rolls and the greater diameter of the plug determine the outside diameter and th wall thickness of the pierced stock. The round, gripped between the rolls, is now forced to rotate between the rolls, and on account of their inclination, is moved forward and is pulled over the plug. The rolls at the same time are exerting a pressure upon the outside of the round which is rapidly rotating and at the same time moving forward. This causes a stretching of the inner fibers. The stock is then stretched at the same time the hole is pierced.

The piercing may be summed up in the following operations:

1. The rolling between the cross rolls which make a hole in the center.
2. The forward movement which pushes the outer fibers of the round forward between the rolls.
3. The resistance of the plug which forces the inner fibers to stretch along the conical surface of the plug.

The piercing plug and its supporting rod are

now held in position again and the forward movement of the hollow ingot is stopped by an abutment gate. After the piercing the gate is swung open, the hollow round is taken off the plug rod, and the stock is conveyed to the Pilger mill for finishing. When a new plug has been put on the piercing rod, the gate is closed and the mill is in readiness for piercing the next ingot.

The Pilger mill mentioned in the above paragraph is used to smooth the hollow round. Contrary to the other tube rolling and drawing processes, the Pilger process is carried out by a single pair of rolls. The rolls rotate against each other or rather in the opposite direction. The hollow bloom is forced back a certain distance after entering the rolls, and then again forward. Compressed air is used to force it forward, and the motion of the rolls in the opposite direction force it back. The recoil is stopped by an air receiver. The tube is gradually worked through the rolls, and it comes out a true tube.

The rest of the work on the tube is simply a matter of threading, stamping, and painting. The tube is now ready to be loaded and shipped as a finished product.